Are Routine Checkups Necessary? : The Shinawatra's Employee Study

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Abstract

The authors performed a survey in 3,615 Shinawatra employees aged 18-60 years to determine the abnormalities found with routine checkup. The annual checkup included: history taking, anthropometric measurement, physical examination, complete blood count, urine analysis, chest roentgenography, blood chemistry (fasting blood glucose, BUN, creatinine, uric acid, AST/ALT, cholesterol, triglyceride and HDL-cholesterol). The prevalence of abnormalities with management change detected by complete blood count, urine analysis was low and we did not recommend the routine use of complete blood count and urine analysis. The prevalence of hypertension was more common in males and the prevalence increased sharply after the age of 25 years in males and 40 years in females. The prevalence of abnormalities of BUN, creatinine (both males and females) and uric acid (in females) was very low. There was high prevalence of high AST/ALT which suggested hepatitis in our population, and the prevalence was more common in males beginning at a young age. Diabetes mellitus was more common in males especially after the age of 45 years. Chest roentgenography abnormalities were found in 9.4 per cent and the prevalence of abnormalities increased with age and was common after the age of 44 years. Most of the abnormalities found by chest roentgenography were pulmonary infiltration and cardiomegaly.

The authors' findings did not recommend the routine use of complete blood count, urine analysis, fasting BUN and creatinine. We recommend routine blood pressure measurement in males aged 25 years or more and in females aged 40 years or more. We suggest routine blood cholesterol measurement in both sexes, blood triglyceride measurement in males aged 25 years or more and fasting blood sugar tests in males aged more than 44 years, chest roentgenography in males and females after the age of 45 years.

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In 1981, the Medical Practice Committee of the American College of Physicians (ACP) advised that routine annual checkups for healthy adults be abandoned in favor of a more selective approach to the prevention and detection of health problems[1]. Drawing on four major assessments of the periodic health examination-by Frame and Carlson[2-5], Breslow and Somers[6], the Canadian Task Force (CTF) on the Periodic Health Examination[7], and the American Cancer Society (ACS)[8]- the committee compared the ages at which preventive interventions were advised to be provided for asymptomatic adults[1]. Clinicians were urged to use this information to tailor their preventive efforts to the age and sex of their patients.

Over the past decade, both the content and number of recommendations available to clinicians about the provision of preventive health services have changed. Frame and Carlson, the CTF, and the ACS, for example, have revised and expanded the scope of their original recommendations[9-24]. In addition, the United States Preventive Services Task Force (USP-STF) and the ACP have issued their own sets of guidelines pertaining to preventive care[25,26]. These most recently generated practice guidelines not only are based on increasingly rigorous assessments of the value and cost of preventive interventions, but also focus increased attention on the delineation and implications of risk factors as well as on the potential value of an expanded array of preventive interventions, such as patient counseling and chemoprophylaxis.

In Thailand, annual checkups are routinely performed and their cost can be reimbursed for employees of the government and some private organizations. However, several of the tests, e.g. hemoglobin measurement, urine analysis or fasting plasma glucose, are not considered necessary and are not recommended by the ACP, CTF, USPSTF and others. Several tests such as the serum lipids level are usually not performed even when they are recommended by the ACP, CTF and USPSTF. We performed a study to determine the abnormalities found by annual checkups in Shinawatra employees aged 18-60 years in order to provide recommendations for the Thai population.

MATERIAL AND METHOD

A cluster sampling survey was performed in Shinawatra employees, who were relatively young, highly educated and had a high socioeconomic status. Rose and Blackburn questionnaires were completed by the subjects to gather information about their demographics, education, family income, presence of heart disease and risk factors, physical activity, stress, alcoholic consumption and angina history. The questionnaires also included specific questions concerning any history of hematologic disorders or peptic ulcers; urine abnormalities or stones; history of tuberculosis or contact; history of liver disease, jaundice, family history of hepatocellular carcinoma, chronic hepatitis or carriers, history of diabetes mellitus or lipids abnormalities or receiving treatment with antidiabetic or lipid lowering agent, and the history of recent illnesses or hospitalization.

Standing height was measured with the subject in bare feet, back square against the wall and eyes looking straight ahead and weight was measured in undergarments using a balanced scale to the nearest 200 grams. The scale was standardized to 0 before each use. Waist and hip circumference was measured to the nearest 0.1 cm using a nonstretchable standard tape measure attached to a spring

balance exerting a force of 750 grams (Ohaus tape). The waist circumference was taken over the unclothed abdomen at the smallest diameter between the costal margin and the iliac crest. The tape measure was kept horizontal and just tight enough to allow the little finger to be inserted between the tape and the subject's skin. The hip circumference was taken at the level of greater trochanters (usually the widest diameter around the buttocks).

The blood pressure was found using standard mercury sphygmomanometer twice on the right arm and the exact values recorded to the nearest 2 mmHg. A third measurement was performed if there was 10 mmHg or more difference between the first two readings and the average of the two closest values was used for the analysis. The correlation coefficients between the two measurements of systolic and diastolic blood pressure were 0.94 and 0.89 respectively.

Blood samples were taken after 10-12 hours fasting and were processed within 4 hours and the serum stored in -70' C for further analysis. The laboratory tests performed included complete blood count, fasting blood sugar, serum lipids (cholesterol, triglycerides and HDL-cholesterol), serum creatinine and uric acid using Hitachi 717 and 917 automation system. The coefficients of variation between run and within run were performed every day and were less than 5 per cent. The external quality control was performed every 4 weeks by joining the QAP (quality assurance program) from Roche Diagnostics. The coefficients of variation for fasting blood glucose, serum cholesterol, triglycerides and HDL-cholesterol were 1.36 per cent, 2.29 per cent, 3.09 per cent and 3.45 per cent respectively. Chest X-rays were performed using the standard method and the results were interpreted by one of our investigators. Twelve lead electrocardiographies were performed in those subjects aged more than 30 years using the HP- playwriter XII with the autoanalyzer and were confirmed by one of the investigators. The management change or recommendations concerning the abnormalities were recorded by the investigators.

The data was recorded twice in the Dbase Foxpro by two separate research assistants. If there was any discrepancy between the two values, the data were checked and corrected. A telephone call was made directly to the subject to obtain any missing data from the questionnaires. The completeness of our data ranged from 99.0-99.9 per cent.

The statistical analysis was performed by a biostatistician using the SPSS for Window. Univariate analysis, linear regression and logistic regression were applied where appropriate.

RESULTS

A total of 3,615 subjects were studied, 1,250 (34.3%) were male and 2,365 (65.7%) were female. The mean age was 30.0 ± 5.6 years (range 18-58). Most of the population had family income more than 10,000 baht/month and graduated from a university or higher.

The prevalence of abnormalities found on routine complete blood count and urine analysis are shown in Table 1. The prevalence of anemia as classified by hematocrit <30% or hemoglobin <10 gm% was 0.4% (0.1% in males and 0.6% in females). All of the anemia occurred in the age range of 25-39 years old. All of the anemic patients in this range were advised to seek medical consultation to find the cause of anemia. The prevalence of leukocytosis (total WBC >11,000/cu. mm.) was 2.1 per cent (1.7% in males and 2.3% in females) but there was no management change as there was no evidence from the differential count that was suggestive of infections or hematologic malignancies. The prevalence of thrombocytopenia was 1.0 per cent (1.0% in males and 0.9% in females). The overall prevalence of pyuria (WBC>5/HPf) and hematuria (RBC>5/HPF) was 4.5 per cent and 7.5 per cent respectively and the prevalence was more common in females (6.1% vs 1.3% and 10.4% vs 2.6%). Most of the urine findings were probably due to menstruation and there were no symptoms or signs of urinary tract infection.

The prevalence of hypertension (BP >139/89 mmHg) was 7.4 per cent (15.4% in male and 3.2% in female). The prevalence of hypertension increased with increasing age (see Table 2). The prevalence in male increased sharply after the age of 25 while the prevalence in female gradually increased and was 8.1 per cent after the age of 40 years.

The prevalence of hypercholesterolemia (serum cholesterol >199 mg%) was 54.7 per cent in male and 43.1 per cent in female and the prevalence of hypercholesterolemia (serum cholesterol >239 mg%) was 19.5 per cent in male and 11.8 per cent in female. Tha age stratified prevalence of hypercholesterolemia is shown in Table 2. The prevalence was high at a young age and gradually increased

Table 1. Abnormalities found on routine complete blood count and urinalysis stratified by age and sex.

Age (yrs)	Anemia M	Anemia F	Leukocytosis M	Leukocytosis F	Thrombocytopenia M	Thrombocytopenia F	Pyuria M	Pyuria F	Hematuria M	Hematuria F
<25	0/143 (0%)	0/342 (0%)	2/143 (1.40%)	15/342 (4.39%)	0/143 (0%)	2/342 (0.48%)	2/146 (1.37%)	16/346 (4.62%)	5/146 (3.42%)	24/346 (6.94%)
25-29	1/428 (0.23%)	7/988 (0.71%)	11/429 (2.56%)	19/989 (1.92%)	6/428 (1.40%)	9/989 (0.91%)	7/432 (1.62%)	59/1002 (5.89%)	9/432 (2.08%)	106/1002 (10.58%)
30-34	0/343 (0%)	5/711 (0.70%)	4/343 (1.17%)	13/711 (1.83%)	3/343 (0.87%)	8/711 (1.13%)	1/345 (0.29%)	52/721 (7.21%)	4/345 (1.16%)	83/721 (11.51%)
35-39	0/176 (0%)	2/198 (1.01%)	3/176 (1.70%)	6/198 (3.03%)	1/176 (0.57%)	1/198 (0.51%)	4/177 (2.26%)	8/199 (4.02%)	3/177 (1.69%)	20/199 (10.05%)
40-44	0/79 (0%)	0/61 (0%)	1/79 (1.27%)	1/61 (1.64%)	1/79 (1.27%)	2/61 (3.26%)	1/80 (1.25%)	7/62 (11.29%)	2/80 (2.50%)	11/62 (17.74%)
>44	0/24 (0%)	0/63 (0%)	0/63 (0%)	0/24 (0%)	1/63 (1.59%)	0/24 (0%)	1/63 (1.59%)	1/24 (4.17%)	1/63 (1.59%)	2/24 (8.33%)
Total	1/1193 (0.08%)	14/2363 (0.59%)	21/1233 (1.70%)	54/2325 (2.32%)	12/1232 (0.97%)	22/2325 (0.96%)	16/1243 (1.29%)	143/2354 (6.07%)	24/1243 (1.93%)	246/2354 (10.45%)

Table 2. Abnormalities found on serum lipids and blood pressure measurement stratified by age and sex.

Age (years)	Chol 200-239 M	Chol 200-239 F	Cholesterol >239 M	Cholesterol >239 F	High triglyceride M	High triglyceride F	Low HDL-Chol M	Low HDL-Chol F	Hypertension M	Hypertension F
<25	46/145 (31.72%)	89/344 (25.87%)	13/145 (8.97%)	35/344 (10.17%)	4/145 (2.76%)	4/344 (1.16%)	1/145 (0.69%)	10/344 (2.91%)	9/144 (6.25%)	4/347 (1.15%)
25-29	134/429 (31.24%)	295/992 (29.74%)	56/429 (13.05%)	91/992 (9.17%)	37/429 (8.62%)	11/992 (1.11%)	20/429 (4.66%)	7/992 (0.71%)	41/431 (9.51%)	24/997 (2.41%)
30-34	124/344 (36.05%)	234/715 (32.73%)	72/344 (20.93%)	98/715 (13.71%)	39/344 (11.34%)	10/715 (1.40%)	21/344 (6.10%)	6/715 (0.84%)	55/344 (15.99%)	29/718 (4.04%)
35-39	70/178 (39.33%)	75/198 (37.88%)	57/178 (32.02%)	39/198 (19.70%)	33/178 (18.54%)	3/198 (1.51%)	13/178 (7.30%)	2/198 (1.01%)	33/173 (19.08%)	9/197 (4.57%)
40-44	39/79 (49.37%)	28/61 (45.90%)	23/79 (29.11%)	5/61 (8.20%)	16/79 (20.25%)	1/61 (1.64%)	7/49 (14.29%)	1/61 (1.64%)	23/79 (29.11%)	5/62 (8.06%)
>44	23/63 (36.51%)	11/24 (45.83%)	21/63 (33.33%)	7/24 (29.17%)	15/63 (23.81%)	2/24 (8.33%)	7/63 (11.11%)	0/24 (0%)	30/62 (48.39%)	4/24 (16.67%)
Total	436/1238 (35.22%)	732/2334 (31.36%)	242/1238 (19.55%)	275/2334 (11.78%)	144/1238 (11.63%)	31/2334 (1.33%)	69/1208 (5.71%)	26/2334 (1.11%)	191/1233 (15.49%)	75/2345 (3.19%)

with age. Hypertriglyceridemia (serum triglyceride >199 mg%) was more common in males and the prevalence in males gradually increased with increasing age but the prevalence in females remained constant until after the age of 44 when the prevalence jumped from 1.6 per cent to 8.3 per cent. The overall prevalence of low HDL-cholesterol was 2.7 per cent (5.6% in males and 1.1% in females).

The prevalence of diabetes mellitus (Table 3) gradually increased with age in males, and after the age of 44 years the prevalence increased sharply up to 11.1 per cent while the prevalence in females was low and did not increase much with age. The prevalence of impaired fasting glucose (IFG) was more common than the prevalence of diabetes mellitus and the prevalence of IFG increased with age in both males and females. The prevalence of IFG was higher in males and the prevalence was almost double after the age of 40 years in males when compared with the prevalence in the lower age group.

The prevalence of high BUN and creatinine (which suggests renal abnormalities) was very low and there was no difference in different age and sex. The prevalence of hyperuricemia was also very low in females. The prevalence of hyperuricemia was higher in males and the prevalence increased significantly after the age of 30 years (from 6.99% to 13.37%) and after that the prevalence gradually increased with age.

The prevalence of high AST/ALT (which suggests liver abnormalities) was more common in males (22.1% vs 4.5%). The prevalence did not increase much with age in females except after the age of 44 years. But the prevalence in that age group may not be accurate due to the small number of patients in that age group. The prevalence in males gradually increased with age and the prevalence plateaued after the age of 30 years.

The total number of chest X-rays performed was 3532 (97.7% of the total subjects). Three hundred and thirty one employees (9.4%) had abnormalities found in the chest X-ray. The abnormalities found are listed in Table 4. The prevalence of chest X-ray abnormalities was more common in males (14.9% vs 6.4%) and increased with age. The prevalence sharply increased after the age of 45 years especially in males and the prevalence gradually increased with age in females. The prevalence of cardiomegaly, pulmonary infiltration increased with age and the prevalence of these abnormalities was almost twice as much after the age of 45 years.

DISCUSSION

According to our study, the prevalence of significant anemia was low and the need to perform the hematocrit level routinely was thus not necessary. The lesser degree of anemia was more common, however this level of anemia may be managed

Table 3. Showed abnormalities found on blood chemistry analyses stratified by age and sex.

Age (years)	DM		Hyperuricemia		High BUN/ Creatinine		High AST/ALT	
	M	F	M	F	M	F	M	F
<25	0/145 (0%)	0/344 (0%)	8/145 (5.52%)	0/344 (0%)	0/145 (0%)	0/344 (0%)	21/145 (14.48%)	16/344 (4.65%)
25-29	3/429 (0.69%)	2/993 (0.20%)	30/429 (6.99%)	3/993 (0.30%)	0/429 (0%)	0/993 (0%)	80/429 (18.65%)	49/992 (4.94)%
30-34	7/344 (2.03%)	0/716 (0%)	46/344 (13.37%)	3/715 (0.42%)	0/344 (0%)	1/715 (0.14%)	86/344 (25%)	23/715 (3.22%)
35-39	7/178 (3.93%)	1/198 (0.51%)	28/178 (15.73%)	1/198 (0.51%)	1/178 (0.56%)	0/198 (0%)	51/178 (28.65%)	8/198 (4.04%)
40-44	3/80 (3.75%)	0/61 (0%)	12/79 (15.19%)	0/61 (0%)	0/79 (0%)	0/61 (0%)	21/79 (26.58%)	4/61 (6.56%)
>44	7/63 (11.11%)	0/24 (0%)	11/63 (17.46%)	0/24 (0%)	0/63 (0%)	0/24 (0%)	15/63 (23.81%)	5/24 (20.83%)
Total	27/1239 (2.18%)	3/2336 (0.13%)	135/1238 (10.90%)	7/2335 (0.29%)	1/1238 (0.08%)	1/2335 (0.04%)	274/1238 (22.13%)	105/2334 (4.50%)

**Table 4.   Abnormalities found by routine chest ro-
entgenography in Shinawatra's employees**

Chest Roentgenography	Number	Percentage (%)
Total number	3532	100
Total abnormalities	331	9.4
Borderline cardiomegaly	48	1.4
Cardiomegaly	40	1.1
Cardiomegaly with congestion	7	0.2
Dextrocardia	3	0.1
Pulmonary infiltration	91	2.6
Pulmonary nodule	13	0.4
Increased lung marking	18	0.5
Pulmonary fibrosis	17	0.5
Pleural thickening	8	0.2
Scoliosis	44	1.2
Miscellaneous	42	1.2

by nutrition supplementation using the population approach. The prevalence of leukocytosis was 2.1 per cent but did not lead to any management change and the prevalence of thrombocytopenia was less than 1 per cent. These findings were compatible with the recommendation of the preventive care guidelines[27] which suggested that the complete blood count was not necessary except in those with low socioeconomic status or institutionalized elderly.

Urine abnormalities were relatively more common in females than in males but did not lead to any management change and should not be routinely performed. The urine abnormalities in female were probably due to menstruation. The prevalence of pyuria and hematuria in males was 1.3 per cent and 1.9 per cent respectively but there were no symptoms and the renal functions were normal routine urine analysis. Again our findings were compatible with the prevenhtive care guidelines 1991[27] which did not recommended routine urine analysis.

Our study showed that the prevalence of diabetes mellitus was very low in females and the routine fasting blood sugar determination in females should not be recommended. However our data did not have enough samples in females aged more than 44 years. In males the prevalence of diabetes mellitus gradually increased with age and the prevalence increased sharply after the age of 44 years (11.1%), therefore fasting blood sugar should be

performed only in male with age more than 44 years. Our findings were similar to the recommendation by the National Academy of Sciences Institute of Medicine[28] which suggested that fasting blood sugar should be performed in males aged more than 40 years but were different from the ACP, CTF, USPSTF recommendation which required additional criteria for performing fasting blood sugars i.e. obesity, family history of DM, evidence of early occlusive vascular disease and personal history of gestation DM.

The prevalence of hypertension (BP 140/90) increased with age and was higher in males. The prevalence in males after the age of 25 was more than 9 per cent and the prevalence in females was more than 8 per cent after the age of 40 years. Therefore we recommended blood pressure measurement in males or females aged more than 25 years and 40 years respectively. The prevalence of hypercholesterolemia was very common even at a young age both in males and females and should be measured in all patients regardless of age and sex. Our findings were also similar to the preventive practice guidelines[27]. We also had additional data concerning the fasting triglycerides and HDL-cholesterol. Our findings showed that the prevalence of hypertriglyceridemia was high in males after the age of 25 years but not in females before the age of 44 years. We recommended that the fasting triglycerides level should be performed in males after the age of 25 years. The low HDL-cholesterol was uncommon in females but was more common in males. The prevalence of low HDL-cholesterol in males gradually increased after the age of 25 years and reached the highest level after the age of 40 years. If the treatment of low HDL-cholesterol is to be effective, testing should be recommended after the age of 25 years.

Our findings did not recommend the routine examination of the fasting BUN, creatinine in both males and females and recommended against the routine determination of the fasting uric acid level in female as the prevalences were almost negligible. Our data suggested that if the treatment of hyperuricemia in males is to be effective, testing should be performed after the age of 30 in males. These tests were not recommended by others[1,27].

Hepatitis, alcoholic or viral, are very common in Thailand. The liver abnormalities (high AST/ALT level) were very common in males

and increased with age. The abnormalities were also common in females but with a lesser degree. Although testing the liver enzyme level was not recommended by others[1,27]; our findings suggested that it should be performed routinely in all cases because the prevalence of viral hepatitis is very high in our population and the treatments at present are effective.

Previous guidelines did not recommend the routine use of chest roentgenography to detect lung carcinoma. The occurrence of lung nodules or carcinoma in our study was very uncommon, however the occurrence of chest roentogenography abnormalities was common after the age of 45 due to pulmonary infiltration (which most likely suggested tuberculosis) and cardiomegaly (probably due to rheumatic heart disease). Our findilngs suggested that chest roentgenography should be performed in males and females after the age of 44 years.

SUMMARY

The authors' findings did not recommend the routine use of complete blood count, urine analysis or fasting BUN, creatinine. Our data suggested routine blood pressure measurement in males aged more than 25 years and females aged more than 40 years. We also suggested routine blood cholesterol measurement in both sexes, fasting triglycerides in males after the age of 25 years, fasting blood sugar in males aged more than 44 years, AST/ALT in all cases, and chest roentgenography in all cases after the age of 45 years.

Limitations of the Study.

The authors' study population had high socioeconomic status and high educational background. It did not include those whose age was more than 60 years. Therefore the recommendation should not be extrapolated to other populations, especially to those with low socioeconomic status and the elderly.

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การตรวจร่างกายประจำปีมีความจำเป็นหรือไม่ ? การศึกษาในกลุ่มพนักงานบริษัทชินวัตร

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วันดี โรจนะสิริ, พย.บ.*, วิภาวิน วัฒนะประการชัย, พย.บ.*, ศุภชัย ไชยธีระพันธ์, พ.บ.*

ผู้วิจัยได้ทำการศึกษาความผิดปกติที่พบจากการตรวจร่างกายประจำปี ในกลุ่มพนักงานชินวัตรจำนวน 3,615 ราย อายุ 18–60 ปี การตรวจประกอบด้วยการซักประวัติ การตรวจร่างกาย การวัดน้ำหนัก ส่วนสูง รอบเอวและรอบสะโพก การตรวจภาพรังสีทรวงอก การตรวจเลือดเพื่อตรวจหาระดับน้ำตาล, BUN, creatinine, uric acid, AST/ALT, ระดับไขมัน cholesterol, triglyceride และระดับ HDL–cholesterol

การศึกษาพบว่ามีความผิดปกติจากการตรวจ complete blood count, การตรวจปัสสาวะที่มีการเปลี่ยนแปลงในการรักษาต่ำ โรคความดันโลหิตสูงพบได้เพศชายบ่อยกว่าเพศหญิงและความชุกของโรคความดันโลหิตสูงพบเพิ่มขึ้นตามอายุ และพบสูงขึ้นชัดเจนในเพศชายที่อายุ 25 ปีหรือมากกว่า และในเพศหญิงอายุ 45 ปีหรือมากกว่า พบความผิดปกติของ BUN, creatinine และ uric acid (เฉพาะในเพศหญิง) ต่ำมาก มีความผิดปกติของระดับ AST/ALT สูงทั้งชายและหญิง ซึ่งบ่งว่ามีตับอักเสบร่วมด้วย โรคเบาหวานพบได้สูงขึ้นในเพศชายที่อายุ 45 ปีหรือมากกว่า มีความผิดปกติของภาพรังสีทรวงอก 9.4% ความผิดปกติที่พบบ่อยคือ pulmonary infiltration และหัวใจโต โดยที่ความผิดปกติพบสูงเมื่ออายุ 45 ปีขึ้นไป

จากการศึกษานี้ ผู้วิจัยไม่แนะนำให้ตรวจ completes blood count และตรวจปัสสาวะเป็นประจำ เช่นเดียวกัน ไม่มีความจำเป็นในการตรวจระดับ BUN, creatinine และ uric acid (ในเพศหญิงควรทำการตรวจระดับ cholesterol และระดับ AST/ALT ทุกราย ควรตรวจระดับน้ำตาล ในชายอายุ 45 ปีหรือมากกว่า และควรตรวจภาพรังสีทรวงอกในทุกราย ที่อายุ 45 ปีขึ้นไป ควรตรวจระดับความดันโลหิตและระดับ triglyceride ในชายอายุ 25 ปีขึ้นไป และตรวจระดับความดัน–โลหิตในหญิงอายุ 40 ปีขึ้นไป

คำสำคัญ : ตรวจร่างกายประจำปี, การตรวจเลือด, การตรวจภาพรังสีทรวงอก

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